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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LAIOS, MARIA J

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/573,003	Applicant(s) MERLO ET AL.	
	Examiner MARIA J. LAIOS	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment filed 16 October 2008. Claim 1 has been amended to include the subject matter of claim 2. Claim 2 has been cancelled. Claims 1 and 3-13 are finally rejected for reasons necessitated by applicant's amendment and for the reasons of record.

Claim Rejections - 35 USC § 103

2. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Applicant's admitted prior art and Baldauf et al. or Schid are maintain but have been amended to include the subject matter of claim 2.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (Figures 1 and 2 with explanation on Page 6 line 24 through Page 7 line 23) in view of Baldauf et al (US 2003/0027031 A1) and Murphy et al (US 2003/0039729 A1).

As to claim 1, the applicant's admitted prior art discloses a stack comprising a plurality of fuel cells (2), a plurality of cooling devices (9) a cooling fluid (water is Page 7

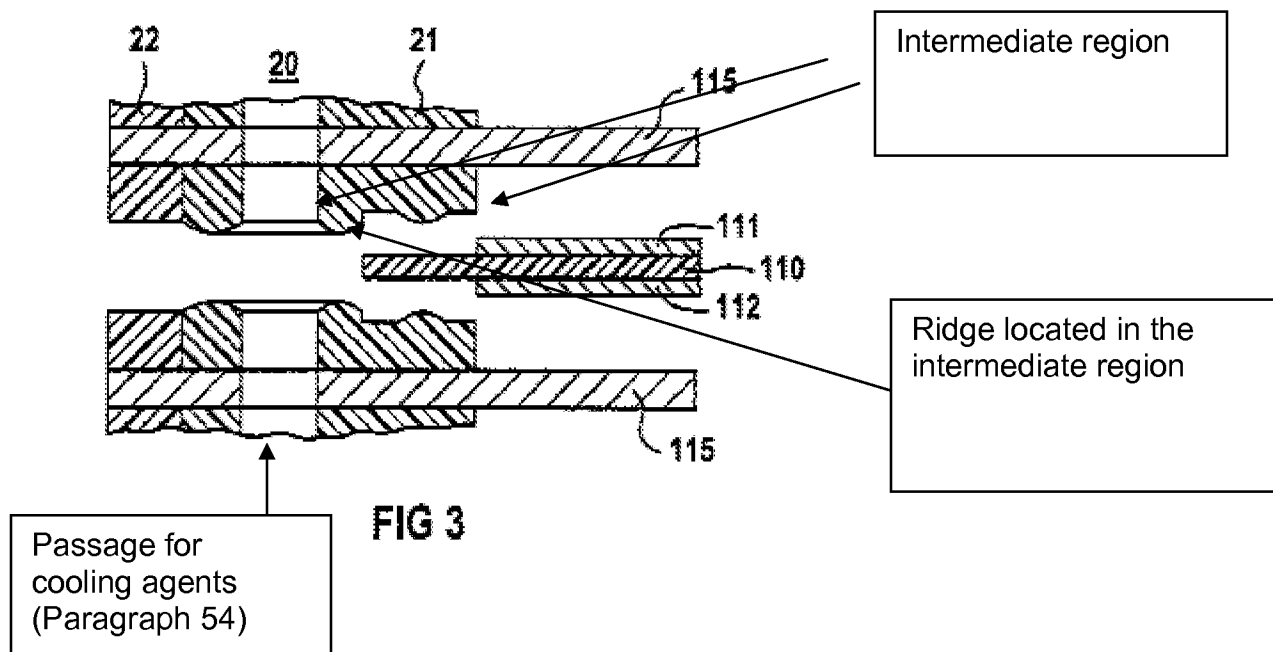
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line 16) and a plurality of metal bipolar plates (6) and gaskets (14, 8 and 10) having passages opening for feeding a reactant gas (20a,20b) for extracting a residual gas (20c, 20d) and injecting and discharging a cooling fluid (20e, 20f).

Each fuel cell comprises an ion exchange membrane (2) and the gasket framing the perimeter of the current collector (2h and 2g). Each cooling device comprises an electrically conductive spacer (11) and the cooling fluid flows through the cooling device (24, 25) and each fuel cell is delimited by a pair of bipolar plates (6, Figure 1).

Applicant's admitted prior art fails to disclose the cooling fluid being separated from the ion exchange membrane and that the bipolar plate closes to the negative terminal is free of openings for fluid passage.

Baldauf et al. disclose a fuel cell stack with a gasket and a membrane. Baldauf discloses the perimeter of the membrane (110) in the intermediate region (see figure below)



It would have been obvious to one of ordinary skill in the art at the time of the invention to include the seals of Baldauf in the fuel cell system of Admitted Prior art because this would prevent the interaction of the fluids traveling through passages with the membrane.

Applicant's admitted prior art modified by Baldauf et al. discloses the structure of the fuel cell as discussed above but fails to disclose the bipolar plate closest to the negative terminal is free of openings for fluid passages.

Murphy et al. discloses an electrolyzer with a PEM (12) and bipolar plates (62) and the plate closest to the negative terminal is free of fluid passages (36) discloses a plate (14).

It would have been obvious to include a plate with no passages at one end of the stack because this allows for the inlets and outlets of the system to be located one side thus allowing for the fuel cell system to be placed against a wall.

3. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (see Applicant's Specification pages 6 line 6 to page 10 line 14 and Figures 1 and 2) in view of Baldauf et al (US 2003/0027031 A1) and Murphy et al (US 2003/0039729 A1) as applied to claim 1 above, and further in view of Abd Elhamid et al (US 2005/0267004 A1).

As to claim 4, Applicant's Admitted prior art modified by Baldauf and Murphy discloses the structural components as discussed above in claim 1 and incorporated herein but fail to disclose the composition of the stainless steel.

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Abd Elhamid et al. teaches a PEMFC in which the bipolar plates have a stainless steel composition of at least 16 percent by weight of chromium, nickel is at least 20 percent by weight and molybdenum is at least 3 percent by weight in order to provide a high bulk electrical conductivity and corrosion resistance (Paragraph 34).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use stainless steel having a composition of at least 16 percent by weight of chromium, nickel at least 20 percent by weight and molybdenum at least 3 percent by weight for the bipolar plates of the electrochemical cell stack of Admitted prior art modified by Baldauf et al. and Murphy in order to provide corrosion resistance electrical conductivity as taught by Abd Elhamid et al.

With regard to claim 5, Abd Elhamid et al. further explains that the bipolar plate is a metal substrate (Paragraph 55) this metal substrate/electrically conductive element can be made of stainless steel 316L (Paragraph 38).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (see Applicant's Specification pages 6 line 6 to page 10 line 14 and Figures 1 and 2) in view of Baldauf et al (US 2003/0027031 A1) and Murphy et al (US 2003/0039729 A1) as applied to claim 1 above, and further in view of Dickman et al (US 2003/0049502 A1)

As to claim 6, Admitted Prior Art discloses water as the cooling fluid but fails to disclose the circuit is closed. Dickman et al. discloses a heat exchange loop is a closed

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loop with deionized water in order to prevent metal ions from being introduced into the fuel cell stack (Paragraph 33).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the closed loop of deionized water of Dickman et al as the cooling fluid in modified Admitted Prior art because it prevents metal ions from being introduced into the fuel cell stack.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (Figures 1 and 2 with explanation on Page 6 line 24 through Page 7 line 23) in view of Schmid et al (US 6080503) and Murphy et al (US 2003/0039729 A1).

As to claim 1, the applicant's admitted prior art discloses a stack comprising a plurality of fuel cells (2), a plurality of cooling devices (9) a cooling fluid (water is Page 7 line 16) and a plurality of metal bipolar plates (6) and gaskets (14, 8 and 10) having passages opening for feeding a reactant gas (20a,20b) for extracting a residual gas (20c, 20d) and injecting and discharging a cooling fluid (20e, 20f).

Each fuel cell comprises an ion exchange membrane (2) and the gasket framing the perimeter of the current collector (2h and 2g). Each cooling device comprises an electrically conductive spacer (11) and the cooling fluid flows through the cooling device (24, 25) and each fuel cell is delimited by a pair of bipolar plates (6, Figure 1).

Applicant's admitted prior art fails to disclose the cooling fluid being separated from the ion exchange membrane and that the bipolar plate closes to the negative terminal is free of openings for fluid passage.

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Schmid et al. discloses a PEM fuel cell and discloses the openings of the membrane (5MEA figure 5a, the passageway (30) are aligned with the holes in the membrane) is larger than the passage ways (30) which allows for the bonding agent/sealing element (50) to encapsulate the edges of the membrane to prevent damage to the membrane (col. 8 lines 48-51) thus keeping the cooling fluid separated from the ion exchange membrane. It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the membrane of Admitted prior art with the membrane of Schmid because Schmid teaches the opening of the membrane larger than those of the holes that allow for the passage of fluids this prevents the damage of the membrane by allowing for the bonding agent/sealing agent to protect the membrane.

Applicant's admitted prior art modified by Schmid et al disclose the structure of the fuel cell as discussed above but fails to disclose the bipolar plate closest to the negative terminal is free of openings for fluid passages

Murphy et al. discloses an electrolyzer with a PEM (12) and bipolar plates (62) and the plate closest to the negative terminal is free of fluid passages (36) discloses a plate (14). It would have been obvious to include a plate with no passages at one end of the stack because this allows for the inlets and outlets of the system to be located one side thus allowing for the fuel cell system to be placed against a wall.

6. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (see Applicant's Specification pages 6 line 6 to page 10 line 14 and

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Figures 1 and 2) in view of Schmid et al (US 6,080,503) and Murphy et al (US 2003/0039729 A1) as applied to claim 1 above, and further in view of Abd Elhamid et al (US 2005/0267004 A1).

As to claim 4, Applicant's Admitted prior art modified by Schmid et al. and Murphy et al. disclose the structural components as discussed above in claim 1 and incorporated herein but fails to disclose the composition of the stainless steel.

Abd Elhamid et al. teaches a PEMFC in which the bipolar plates have a stainless steel composition of at least 16 percent by weight of chromium, nickel is at least 20 percent by weight and molybdenum is at least 3 percent by weight in order to provide a high bulk electrical conductivity and corrosion resistance (Paragraph 34). It would have been obvious to one of ordinary skill in the art at the time of the invention to use stainless steel having a composition of at least 16 percent by weight of chromium, nickel at least 20 percent by weight and molybdenum at least 3 percent by weight for the bipolar plates of the electrochemical cell stack of Admitted prior art modified by Schmid et al and Murphy in order to provide corrosion resistance electrical conductivity as taught by Abd Elhamid et al.

As to claim 5, Abd Elhamid et al. further explains that the bipolar plate is a metal substrate (Paragraph 55) this metal substrate/electrically conductive element can be made of stainless steel 316L (Paragraph 38).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (see Applicant's Specification pages 6 line 6 to page 10 line 14 and Figures 1

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and 2) in view of Schmid et al (US 6,080,503) and Murphy et al (US 2003/0039729 A1) as applied to claim 1 above, and further in view of Dickman et al (US 2003/0049502 A1)

With respect to claim 6, Admitted Prior Art modified by Schmid et al. and Murphy discloses water as the cooling fluid but fails to disclose the circuit is closed.

Dickman et al. discloses a heat exchange loop is a closed loop with deionized water in order to prevent metal ions from being introduced into the fuel cell stack (Paragraph 33). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the closed loop of deionized water of Dickman et al as the cooling fluid in Admitted Prior art modified by Schmid et al (US 6,080,503) because the prevents metal ions from being introduced into the fuel cell stack.

8. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art (Figures 1 and 2 with explanation on Page 6 line 24 through Page 7 line 23) in view of Schmid et al (US 6080503) and Murphy et al (US 2003/0039729 A1) as applied to claim 1 above, and further in view of Wald et al. (US 7087339 B2).

As to claims 9 and 10, Applicants admitted prior art modified by Schmid and Murphy fails to disclose the sealing element as a non conductive O-ring or gasket.

Wald et al. discloses a fuel cell membrane and teaches a gasket can be made of any suitable elastomeric material including silicones, thermoplastic elastomers and elastomeric adhesives col. 6 lines 1-8). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the adhesive sealing agent of Schmid et al. with a gasket because both are known to be effective sealants in fuel cells

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and Wald et al. teaches that they art recognized equivalents for the same purpose. See MPEP 2144.06.

As to claim 10, Wald et al. further discloses the gasket to be EPDM rubber (col. 6 lines 5).

9. Claims 11-13 rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's prior art (see applicant's specification on Page 6 line 24- Page 7 line 5), Schmid et al (US 6,080,503), Murphy et al (US 2003/0039729 A1) and Wald et al. (US 7,087,339 B2) as applied to claim 9 above, and further in view of Barton et al. (US 6,423,439 B1).

The disclosures Applicant's admitted prior art, Schmid, Murphy and Wald et al. are discussed above and incorporated herein.

As to claim 11, Applicant's admitted prior art, Schmid, and Wald et al. fail to disclose the non conductive elastomer material is in liquid form and cured by UV or thermal treatment.

As to claim 11, Barton et al discloses an elastomer material for a sealant material/non conductive material is flow processable/liquid at the moment of assemble and polymerized by thermal treatment (col. 3 lines 55-63). It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the elastomer of Wald with the liquid polymer of Barton et al because both are known to be effective sealants in electrolytes and the Wald et al. references teaches that they are art recognized equivalents for the same purpose. See MPEP 2144.06.

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As claims 12 and 13, Barton et al discloses a liquid injection moldable compound for example silicones (col. 5 line 25) and from the applicants specification on page 11 "A suitable material is given by liquid silicon resins, which maintain a low hardness and a good elasticity also after completing the curing process" It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the elastomer of Wald with the liquid polymer of Barton et al because both are known to be effective sealants in electrolytes and the Wald et al. references teaches that they are art recognized equivalents for the same purpose. See MPEP 2144.06.

Response to Arguments

10. Applicant's arguments filed 16 October 2008 have been fully considered but they are not persuasive.

Applicant's arguments include

- a. Baldauf or Schmid disclose the cooling fluid is separated from the ion exchange membrane.
- b. Murphy discloses an electrolysis device and therefore is non analogous art to a fuel cell.
- c. The motivation to combine the reference of Murphy

In response to the arguments:

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a) Baldauf and Schmid both provide a form of a gasket around the membrane therefore one would assume that this is meant to isolate the membrane from the various fluids with in the fuel cell.

b) The main structure of a solid polymer fuel cell will include an anode, a cathode, a solid polymer fuel cell located between the anode and the cathode, separator (bipolar plates) located between the electrodes and fluid passages for the reactants. These components are also required in an electrolysis unit. Therefore these structures are similar and thus analogous in terms of structure and not chemical reactants. Furthermore, Murphy discloses the reactants and products entering on one side of the stack which is achieved by the last plate (that does not have fluid going thru it) acting as a return for the reactants. If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. One must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *KSR v. Teleflex*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1397 (2007).

c) In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir.

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1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would be known to one of ordinary skill in the art that a plate without fluid passages would allow the reactants and products to return.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA J. LAIOS whose telephone number is (571)272-9808. The examiner can normally be reached on Monday - Thursday 10 am -7 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795